PERFUSION TECHNIQUES AND LIVER CELL TRANSPLANTATION
Breakthrough could end need for transplants

Bank for liver cells

By FIONA HUDSON

Melbourne scientists have regrown a healthy liver inside a sick mouse without the need for transplant surgery.

Researchers will test the ground-breaking technique on a human within a year.

They say it could also be used to treat common adult liver conditions including hepatitis C and cirrhosis.

The therapy involves freezing healthy liver cells harvested from a donor into the diseased liver.

The frozen cells grow and slowly take over the sick liver to correct the disease. The liver is the only solid organ capable of regenerating itself in this way.

Construction of a special liver cell bank at the Royal Children's Hospital for a ready supply of snap-frozen cells will begin next month.

Human tests of the technique will begin once the bank opens.

It will be one of only a handful of liver cell banks in the world.

Murdoch Children's Research Institute researcher Dr Kean Allen said the technique was exciting because there was a chronic shortage of donor livers for transplant.

"This could help hundreds of Australians every year," he said.

The new method used cells harvested from donor livers or left over from surgery, which are normally unusable for transplant, he said.

Livesaving William Dods, 2, with mother Shelley. Pictures: CRAIG WOOD

Toddler's organ ordeal

By FIONA HUDSON

"It sounds good because there is such a shortage of donor organs," she said.

"If any other child has to go through what William went through, that would be great." The problem with William's original liver — it was missing a bile duct — meant he would have needed a transplant even if the new technique was available, she said.

"But the waiting lists will be shorter when the technique is available, as it will still help kids like him down the track," she said.
The Liver cell Bank

- A facility that processes human hepatocytes
- A facility which stores suspension of liver cells in liquid nitrogen
- Key to the process is perfusion of the liver with collagenase
Why do we need a Liver Cell Bank?

- Liver transplantation one of the most expensive operative procedures ~95,000
- 16% of patients die while on waiting lists
- World wide shortage of donor organs
- Australasian donor rates amongst lowest in the western world, 9.3 per million of population
Liver Cell Transplantation

Recipient PATIENT

Liver Cell Transplantation via portal vein

DONOR Liver

Single cell suspension of liver cells
So Why a Perfusionist?

- Skilled at working with tubing, pumps and fluids (like a winemaker)
- Have appropriate contacts with tubing and component manufactures
Our Brief

- Pump flows between 50 - 300 ml/min (divided between four lines)
- Perfusion temperature between 36 - 38°C
- Re-circulating circuit
- Pressure monitoring
- Air bubble trap
Circuit design

- Core of the circuit was the method of keeping the fluid at temperature
- Helios Cardioplegia Heat exchanger chosen
Where to?
Breakthrough could end need for transplants

Bank for liver cells

MELBOURNE scientists have developed a healthy liver inside a sick mouse without the need for transplant surgery.

Researchers will test the groundbreaking techniques on Vietnam veterans within a year.

They say it could also be used to treat common adult liver conditions including hepatitis C and cirrhosis.

The therapy involves harvesting snap-frozen healthy liver cells harvested from a donor into the diseased liver.

The infused cells grow and divide in the sick liver to correct the disease. The liver is the only solid organ capable of regenerating itself in this way.

Construction of a special liver cell bank at the Royal Children’s Hospital will provide a steady supply of snap-frozen cells.

Dr Fiona Hudson, medical reporter

"It has mostly been used in people whose liver has packed up and they are going to die in a few days," she said.

The therapy had prolonged the patients’ lives, but not saved them because they were too sick, she said.

Dr Allen has just completed a groundbreaking test on mice with mild, not fatal, disease.

"This allows us to put cells in earlier, we don’t have to wait until the patient is dying," she said.

Results of the experiments have been submitted for publication in an international scientific journal.

Dr Allen said research was also under way to see if the therapy could be performed using stem cells.

"The new liver cell bank is funded by donations from Rotary.

Royal Children’s Hospital liver expert Dr Arthur said the new technique was promising.

In the short term, it would offer hope for children with cancer and other disorders of the liver, he said.

"As the technique was perfected it is likely to offer hope to many other patients suffering liver failure. I think it’s very worthwhile," he said.

Lifesaver: William Dods, 2, with mother Shelley. Picture: CRAIG WOOD

Toddler’s organ ordeal

"It sounds good because there is such a shortage of donor organs," she said.

"If no other child has to go through what William went through, that would be great."

"The problem with William’s original liver — it was missing a tube system — meant he would still have needed a transplant even if the new technique was available," she said.

"But the waiting lists will be shorter when the technique is available, as it will still help kids like him down the track," she said.
Acknowledgments

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